(Paragraph at page 2, lines 4-27)

In such an air bag apparatus for side crash, the air bag expands rapidly at the expansion start stage, and expands gradually at the stage in which the body of the rider receives protection power from the air bag. Especially, it is desirable for the air bag to shrink at that time. Such an air bag apparatus for side crash is described in Japanese Laid Open Patent Application (JP-A-Heisei 8-268213: a first conventional example). In the first conventional example, holes are opened on the middle portion of the air bag. However, because there is fear that the holes receive any damage when expanding, a perimeter of the hole is reinforced. Thus, the reinforcement effect around the hole is excellent. In the first conventional example, the reinforcement effect is achieved by the formation of the protrusion. Such a protrusion is folded and the protrusion is pushed into the inner space of the air bag. In the first conventional example, the expansion is rapid at the expansion start stage and contraction is carried out at the expansion end stage. Also, it is important that the air bag apparatus for side crash expands to a predetermined final shape at a

moment in the narrow space between the rider and the side body of the car.

(Paragraph at page 3, line 14-page 4, line 4)

The [try] effort to make the final shape good is shown in Fig. 3. In the air bag apparatus for side crash shown in Fig. 3, by limiting the expansion width W in the direction perpendicular to the side surface of the air bag 105 within a predetermined value, the shape on the expansion way or operation is controlled. To make such limitation effective, an inner forming section (an inner side panel) 106 of the air bag and an outer forming section (an outer side panel) 107 are linked by suspenders or hanging bands 108 which are formed inside the air bag. By limiting the length of the suspenders or hanging bands 108 in the perpendicular direction, the above-mentioned width W on the expansion way can be determined. In this way, the width W can be limited in some degree but the angle of the suspender 108 in the perpendicular direction is instable. Such instability makes the width W in the perpendicular direction instable.

(Paragraph at page 4, lines 17-22)

Another object of the present invention is to provide an air bag apparatus for side crash in which an air bag can expand[s] rapidly from an expansion start stage of the expansion to an effective expansion stage and then gas can be bumped or spouted after the effective expansion stage or in an expansion end stage.

(Paragraph at page 5, lines 5-8)

It is another object of the present invention to provide an air bag apparatus for side crash, in which the flow of gas on the way of expansion can be controlled.

(Paragraph at page 8, lines 2-11)

In yet still another aspect of the present invention, an air bag used for an air bag apparatus for side crash, includes first and second side panels. The first and second side panels are sewed in a limb portion such that outer surfaces of the first and second side panels are joined to each other, and the air bag further may include at least one partition provided in an inner space of the air bag, the air bag which is folded initially, [and] expands with gas supplied from an inflater.

(Paragraph at page 10, lines 8-12)

Fig. 14A [are] is a front cross sectional view showing the air bag of the air bag apparatus in the second embodiment, and Fig. 14B is a side cross sectional view showing the air bag of the air bag apparatus in the second embodiment;

(Paragraph at page 12, line 26 - page 13, line 11)

As shown in Fig. 7, the air bag 1 is composed of an air bag main section 6 and a protrusion section 4. The main section 6 and the protrusion section 4 are formed as a unitary body by sewing two sheets of cloth. In the air bag 1 after the expansion, the protrusion section 4 protrudes to the expansion direction L from the tip portion 6 of the main section in the air bag 1. The protrusion section 4 has a pipe-like shape and extends in a direction L' orthogonal to the expansion direction L. The protrusion section 4 has openings 5 at opposing ends and the high-pressure gas spouts from the openings. That is, the opening functions as a vent hole 5.

(Paragraph at page 13, line 21 - page 14, line 23)

Figs. 9A, 9B and 9C show the expanding

process of the air bag 1 folded as mentioned above. The inflation gas is spouted from one region in the air bag radially, as shown by arrows a1, a2 and a3. The inflation gas flows as shown by the arrows a, runs against the wall 8 of the protrusion section 4, form flows b along the wall 8, and are spouted from the vent holes 5 at the both ends of the protrusion section 4. In the first embodiment, the vent holes 5 of the protrusion section 4 are formed in a direction orthogonal to the expansion direction L. The high-pressure gas flows against the wall 8 of the protrusion section 4 and the force of the flow is limited. The gas spouted from the vent hole 5 receives resistance in the surface of the air bag 1 and the flow velocity is limited, because the protrusion section 4 is shorter than the width of the main section in a vertical direction. Such limitation is strong at the expansion start stage shown in Fig. 9A, is weak in the expansion middle stage shown in Fig. 9B, and is the weakest in the expansion end stage shown in Fig. 9C. At the time shown in Fig. 9C, the body of the rider presses the above-mentioned inner side panel. At that time, the quantity of the spouting gas is [much] large and the pressure in the air bag 1

becomes lower than in the expansion start stage and the expansion middle stage. That is, the air [back] bag 1 expands for the rider to be able to be effectively protected when the external force operates [to] on the rider.

(Paragraph at page 14,line 24 - page 15, line 12)

Fig. 10 shows the first modification of the air bag apparatus for side crash according to the first embodiment of the present invention. The first modification is the same as the first embodiment in that the protrusion section 4' is provided but is different from the first embodiment in that the vent holes 5' are not formed at both opposing ends of the protrusion section 4'. One or more vent holes 5' (two in this example) are formed [of] in the proximal region of the protrusion section 4'. The first modification is the same as the above-mentioned first embodiment in that gas flow in the expansion direction L is decelerated by the protrusion section 4', is changed into a direction C orthogonal to the expansion direction L and then the gas flows out from the vent holes 5'.

(Paragraph at page 17,lines 19 - page 18, line 2)

Fig. 14A shows the shape of the air bag apparatus according to the second embodiment of the present invention at the expansion end stage. The inner space of the air bag 1 is divided into partial spaces 1A, 1B and 1C by partitions 4A and 4B in a vertical direction orthogonal to the expansion direction L, as shown in Fig. 14B. The partitions 4A and 4B are provided in the middle region of the air bag 1 in the expansion direction L. In this way, the partitions 4A and 4B determine[s] the shape of the air bag 1 almost in the expanding process.

(Paragraph at page 18, lines 17-26)

Through the division of the inner space of the air bag 1, the high-pressure gas flows from the gas inflow port toward the tip region of the air bag 1 as three flows 5A, 5B and 5C. The flow 5A is formed between the upper limb portion of the air bag 1 and the partition 4A, the flow 5B is formed between the partition[s] 4A and the partition 4B, and the flow 5C is formed between the lower limb portion of the air bag 1 and the partition 4B. The three flows 5A, 5B and 5C join as one flow in the tip region 1A of the air bag 1.

(Paragraph at page 18, line 27 - page 19, line 9)

The partitions 4A and 4B determine[s] the three flow paths 5A, 5B and 5C. Because the flows of the high-pressure gas in the flow paths 5A, 5B and 5C are determined, it is possible to control the expanding process of the air bag 1 in the spaces [5A, 5B and 5C] 1A, 1B and 1C or the positions and shapes of the partitions 4A and 4B. In this way, the partitions 4A and 4B make[s] it possible to determine the shape of the air bag 1 during the expanding process and for the air bag 1 to expand at high speed to the final shape.

(Paragraph at page 19, lines 10-27)

Figs. 15A and 15B show the shape of the air bag 1 in the first modification of the air bag apparatus in the second embodiment at the expansion end stage. In the first modification, a single partition 4A is provided. The partition 4A is provided to be approximately parallel to the expansion direction L in the proximal region of the air bag 1, and extends in an upper direction along the expansion direction L. The partition 4A extends to a region near the upper limb portion of the air bag 1. In this way, two

flow paths are formed. The width of the flow path 5D is narrower than the width of the flow path 5E. Therefore, the high-pressure gas is difficult to flow through the flow path 5D. Therefore, the air bag 1 expands to the direction slightly above the expansion direction L during the expanding process. In this way, by providing the asymmetry spaces, the expansion direction and shape of the air bag 1 during the expanding process can be controlled.

(Paragraph at page 20,line 20 - page 21,line 11)

Fig. 17 is the front cross sectional view showing the third modification of the air bag apparatus in the second embodiment. In the third modification, the partitions 4A and 4B in the second embodiment shown in Figs. 14A and 4B are bent smoothly as much as in the middle region. By this, each of the flow paths 5A, 5B and 5C is composed of regions having an increased cross section and regions having a decreased cross section. The flow path 5A is formed from a narrow flow path 5A-1 on the upstream side and a wide flow path 5A-2 on the downstream side. The flow path 5B is formed from a wide flow path 5B-1 on the upstream side and a narrow flow path 5B-2

on the downstream side. The flow path 5C is formed from a narrow flow path 5C-1 on the upstream side and a wide flow path 5C-2 on the downstream side. The expansion speed of the air bag 1 can be controlled using the combination of the narrow flow paths and the wide flow paths.

(Paragraph at page 22,line 18 - page 23, line 3)

Fig. 20 is the front cross sectional view showing the sixth modification of the air bag apparatus in the second embodiment. Partitions 4F-1, 4F-2 and 4F-3 have the sewing lines to surround three local circle regions 6-1, 6-2 and 6-3 which are arranged in 3 vertexes of a triangle in the air bag 1. Each of flow paths 5E-1, 5E-2 and 5E-3 forms a central rectification line on both sides of a corresponding local region which sinks in the direction orthogonal to the side panel of the air bag 1. The sixth modification shows a low resistance rectification performance and is more excellent in the shape limitation.

(Paragraph at page 23,lines 4-22)

Fig. 21 is the front cross sectional view showing the seventh modification of the air bag

apparatus in the second embodiment. The seventh modification is the same as the sixth modification in that partitions 4G-1, 4G-2 and 4G-3 are arranged in 3 vertexes of the triangle in the air bag 1. However, in the seventh modification, each of the partitions 4G-1, 4G-2 and 4G-3 has a sewing line to half way surround a corresponding one of three local circle regions 6-1, 6-2 and 6-3[, a half]. The local circle region is not fully surrounded and the downstream side is opened. Such opening eases shape limitation on the downstream side. Each of flow paths 5E-1, 5E-2 and 5E-3 forms a central rectification line on both sides of a corresponding local region which sinks in the direction orthogonal to the side panel of the air bag 1. The seventh modification shows a low resistance rectification performance and is more excellent in the shape limitation.

(Paragraph at page 24, lines 2-9)

[The] In the air bag apparatus for side crash of the present invention, the expansion shape restriction during the expanding process is deliberately determined. Also, it is possible to previously determine rapid expansion at the

expansion start stage and the exhaust of the gas at the expansion end stage. Consequently, the expansion energy can be efficiently used.

(Insert paragraph after line 9 on page 24)

Although there have been described what are the present embodiments of the invention, it will be understood by persons skilled in the art that variations and modifications may be made thereto without departing from the gist, spirit or essence of the invention.